CLAIMS:

1. A medical spirometer comprising a housing with a flow inlet and a flow outlet, and a measurement unit (MU), for measuring rate of total flow between said inlet and said outlet when a user exhales through said spirometer, said MU comprising a fluidic jet oscillator adapted to generate oscillating flow characterized by an oscillating parameter dependent on rate of flow through said jet oscillator, and a transducer adapted to convert said oscillating parameter into an oscillating electric signal, wherein

said MU is disposed within said housing so as to form a bypass flow path defined between an outer surface of said MU and an inner surface of said housing, and a measurement flow path defined through said fluidic jet oscillator, such that said total flow is divided into a bypass flow and a measurement flow..

2. The spirometer of Claim 1, wherein said bypass flow path is free of obstructions increasing its pressure drop.

3. The spirometer of Claim 1, wherein measurement flow rate is at least an order of magnitude less than bypass flow rate.

4. The spirometer of Claim 1, wherein said spirometer is of pocket size.

5. The spirometer of Claim 1, wherein the frequency of said oscillating parameter is dependent on the rate of flow through said jet oscillator and said MU further comprises an electronic circuit adapted to measure said frequency and to derive said total flow rate therefrom.

6. The spirometer of Claim 5, wherein said electronic circuit is adapted to store coefficients obtained in previous calibration of said spirometer and to use them for deriving said total flow rate from said frequency.

7. The spirometer of Claim 5, wherein said electronic circuit is adapted to measure said frequency by counting pulses of said oscillating parameter.

8. The spirometer of Claim 7, wherein said electronic circuit is further adapted to integrate said total flow rate, thereby measuring total flow volume per predetermined time.

9. The spirometer of Claim 1, wherein said oscillating parameter is flow velocity.

10. The spirometer of Claim 9, wherein said transducer is hot wire.

11. The spirometer of Claim 1, wherein said oscillating parameter is flow pressure.

12. The spirometer of Claim 11, wherein said transducer is pressure transducer.

13. The spirometer of Claim 12, wherein said pressure transducer is of differential type, said jet oscillator has two feed-back channels, each with a pressure port, and one of said pressure ports is connected to one side of the pressure transducer, while the other one of said pressure ports is connected to the other side of the pressure transducer.

14. The spirometer of Claim 12, wherein said pressure transducer comprises a flexible membrane and a piezoelectric element mounted thereon.

15. The spirometer of Claim 1, wherein said measurement flow path is a first measurement flow path, and said MU comprises a second fluidic jet oscillator adapted to generate oscillating flow dependent on rate of flow therethrough and defining a second measurement flow path within said MU, parallel and opposite to the first measurement flow path, such that a second measurement flow is created when the user inhales through said spirometer.

16. The spirometer of Claim 15, further comprising valve means such that the first measurement flow path is open only when the user exhales while the second measurement flow path is open only when the user inhales.

17. The spirometer of Claim 16, wherein said valve means include one check valve associated with the first measurement flow path and one check valve associated with the second measurement flow path.

18. The spirometer of Claim 15, wherein said oscillating parameter is flow pressure, said transducer is pressure transducer, and both jet oscillators are connected to said transducer.

19. The spirometer of Claim 15, wherein said MU further comprises a second transducer adapted to convert an oscillating flow parameter of the second jet

oscillator into a second oscillating electric signal, such that at exhaling the first jet oscillator works in straight flow while the second jet oscillator works in reverse flow and vice-versa, the two transducers producing oscillating electric signals with different patterns associated with said straight flow and said reverse flow, and the spirometer includes an electronic processor adapted to recognize whether the user inhales or exhales by said different patterns.

20. The spirometer of Claim 19, wherein said patterns differ in that the oscillating signal associated with the reverse flow is noise while the oscillating signal associated with the straight flow has regular pulse structure with the front edge of the first pulse coming before said noise.

21. The spirometer of Claim 1, comprising valve means such that a measurement flow through said jet oscillator is created also when the user inhales through said spirometer, thereby enabling measuring of total flow rate at inhale.

22. The spirometer of Claim 1, wherein at least one of said jet oscillator and said MU can assume a second position with respect to said housing, such that a measurement flow through said jet oscillator would be created when the user inhales through said spirometer, thereby enabling measuring of total flow rate at inhale.

23. The spirometer of Claim 1, further comprising a means to display flow measurement results to the user.

24. The spirometer of Claim 23, further comprising means for identifying a medical condition using said flow measurement results, and for warning the user.

25. The spirometer of Claim 24, further comprising input means for entering personal data of the user, said means for identifying a medical condition being adapted to use said personal data.

26. The spirometer of Claim 24, further comprising means for suggesting preventive measures to the user upon identifying said medical condition.

27. The spirometer of Claim 1, further comprising means for storing measurement data.

28. The spirometer of Claim 27, further comprising communication means for transmitting said data to an external device.

29. The spirometer of Claim 28, wherein said communication means allow for bidirectional data exchange with said external device.

30. The spirometer of Claim 28, wherein said communication means include interface to a cellular phone enabling transmission of said data through cellular phone network.

31. The spirometer of Claim 30, wherein said housing is designed for mounting to the housing of said cellular phone.

32. The spirometer of Claim 30, further including program means transferable to or resident in said cellular phone allowing to display flow measurement results on a display of said cellular phone.

33. The spirometer of Claim 28, wherein said communication means include a built-in cellular phone enabling transmission of said data through a cellular phone network.

34. The spirometer of Claim 1, wherein said housing is adapted to accommodate a dispenser with medicine for inhaling.

35. The spirometer of Claim 34, wherein said housing has a delivery channel for delivery of said medicine for inhaling to the user's mouth.

36. The spirometer of Claim 35, wherein said delivery channel connects an outlet of said dispenser to said bypass channel.

37. The spirometer of Claim 35, wherein an outlet end of said delivery channel is disposed such that said medicine is delivered to a central core of inhaled air flow.

38. The spirometer of Claim 35, further comprising a second fluidic jet oscillator defining a second flow path such that a second oscillating flow is created when the user inhales through said spirometer, said delivery channel connecting an outlet of said dispenser to the inlet of the second jet oscillator, such that the medicine passes through said second flow path.

39. The spirometer of Claim 38, wherein a bypass channel is formed in said second fluidic jet oscillator as an annular channel surrounding said second flow path.

40. A medical spirometer comprising a housing with a flow inlet and a flow outlet, and a measurement unit (MU) disposed in said housing, for measuring rate of total flow between said inlet and said outlet when a user exhales or inhales through said spirometer, said MU comprising a first and a second fluidic jet oscillators each having an inlet and an outlet defining straight flow direction used for measurement and an inoperative, reverse flow direction, and being adapted to generate oscillating flow characterized by an oscillating parameter dependent on rate of straight flow through the jet oscillator, and respective first and second transducers adapted to convert the oscillating parameter into an oscillating electric signal,

wherein the fluidic jet oscillators are in fluid communication with said inlet and said outlet, such that when the user exhales, the first jet oscillator works in the straight flow while the second jet oscillator works in the reverse flow and vice-versa, the two transducers producing oscillating electric signals with different patterns associated with said straight flow and said reverse flow, and the spirometer further includes an electronic processor adapted to recognize whether the user inhales or exhales by said different patterns.

41. The spirometer of Claim 40, wherein said patterns differ in that the oscillating signal associated with the reverse flow is noise while the oscillating signal associated with the straight flow has regular pulse structure with the front edge of the first pulse coming before said noise.

42. An inhaler-dispenser device comprising a housing adapted to accommodate a dispenser with medicine for inhaling, said housing having an inhaling passage with inlet air opening and outlet mouthpiece such that, upon inhaling, an airflow runs from said inlet to said outlet, the housing further having a delivery channel for delivery of said medicine into said airflow, wherein an outlet end of said delivery

channel is such disposed relative to the inhaling passage that, at inhale, a dose of said medicine is delivered to a central core of said airflow in the passage.

43. An inhaler-dispenser device comprising a housing adapted to accommodate a dispenser with medicine for inhaling, said housing further having an inhaling passage with inlet air opening and outlet mouthpiece such that, upon inhaling, an airflow runs from said inlet to said outlet, the housing further having a delivery channel for delivery of said medicine into said airflow, wherein said inhaling passage includes a fluidic jet oscillator with an inlet in fluid communication with said inlet opening and an outlet in fluid communication with said mouthpiece, said delivery channel opening into the inlet of said fluidic jet oscillator.

44. The inhaler-dispenser device of Claim 43, wherein said inhaling passage further comprises an annular bypass channel in fluid communication with said inlet opening and said mouthpiece, said bypass channel surrounding said fluidic jet oscillator such that upon inhaling, an outlet flow of said fluidic jet oscillator carrying said medicine is surrounded by a flow through said bypass channel.

45. The inhaler-dispenser device of Claim 43, wherein said fluidic jet oscillator comprises an annular bypass channel in fluid communication with said inlet opening and said mouthpiece, said bypass channel surrounding the outlet of said fluidic jet oscillator such that upon inhaling, an outlet flow of said fluidic jet oscillator carrying said medicine is surrounded by a flow through said bypass channel.

46. A method for measurement of a user's inhale and exhale rate of flow by means of two fluidic jet oscillators, each having an inlet and an outlet defining straight flow direction used for measurement and an inoperative, reverse flow, and adapted to generate oscillating flow characterized by an oscillating parameter dependent on rate of the straight flow through the jet oscillator, and two respective transducers adapted to convert said oscillating parameter into an oscillating electric signal, said method comprising:

arranging the fluidic jet oscillators in parallel and opposite directions, both being open to inhale and exhale flow, such that when the user exhales, the first jet

oscillator works in the straight flow and when the user inhaled, the second jet oscillator works in the straight flow;

exhaling or inhaling providing flows through said fluidic jet oscillators;

obtaining two oscillating electric signals from said two transducers and processing them to identify which of the two signals is associated with said straight flow using pattern difference between the straight flow and the reverse flow signals, ,and from which transducer this signal comes, and

determining the flow rate from the identified signal.

47. The method of Claim 43, wherein said reverse flow oscillating signal is noise while said straight flow oscillating signal has regular pulse structure with the front edge of the first pulse coming before said noise.